



An Interesting Case of Abrupt Onset Behavioural Abnormality in A Young Female Following Recovery from COVID-19

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Abstract

Clinical manifestation of acute corpus callosum (CC) infarction is complex and lacks specificity. Until there is a high index of suspicion it can be easily missed specifically in the early stage. We report a case of abrupt onset behavioural abnormality following recovery of COVID 19 infection, in a 30 year old female without any prior comorbidities. Her magnetic resonance imaging (MRI) brain revealed small midline DWI restriction at the splenium of the corpus callosum suggesting acute infarct. The typical symptoms of callosal infarction are consciousness or cognitive change, apraxia, such as alien hand syndrome with mild paralysis although in our case it is just an isolated abrupt onset behavioural change. Stroke following COVID 19 is not uncommon but acute onset mental status change following recovery from COVID 19 in a young lady without any apparent vascular risk factors showing MRI evidence of strategically located infarction in the splenium of corpus callosum without any other typical signs of callosal infarct is probably the first reported case in the literature.

Keywords: Corpus Callosal infarct, stroke, splenium of corpus callosum, COVID-19, Post COVID stroke.

Introduction

Case Presentation

A 30-year-old female without any prior comorbidities presented with abrupt-onset behavioural abnormalities in the form of irritability, fearfulness, anxiety, irrelevant talking, and reduced social interaction. There was also a history of a few episodes of aggressiveness and anger outbursts. These symptoms started abruptly, leading to an emergency hospital presentation. She had a recent history of COVID-19 infection two weeks ago and was managed symptomatically at home isolation, with an uneventful clinical recovery. There was no history of headaches, vomiting, neck tightness, or seizures. There was also no history suggestive of any cranial nerve involvement or focal neurological deficits. There was no previous history of such illness. On examination, her general survey was unremarkable, including a normal blood pressure of 122/78mm Hg and a pulse rate of 78/min with a regular rhythm.

Her higher mental function assessment revealed a grossly reduced attention span. Her language, praxis, memory, and visuo-spatial examination were normal. The rest of her detailed neurological and systemic examination were unremarkable. Her routine blood investigations were normal. In view of abrupt-onset behavioural abnormalities, magnetic resonance imaging (MRI) of the brain was advised. MRI brain revealed small midline DWI restriction with reduction of ADC values seen involving the splenium of the corpus callosum suggesting acute infarct (see Figure 1). The other differentials, including primary or secondary CNS demyelination following COVID-19, were ruled out by a contrast MRI brain study, which didn't reveal any contrast enhancement or any other lesions in her brain favouring demyelination. Her visual evoked potential (VEP) study was normal. Her metabolic screen was normal, including normal sugar levels, electrolytes, and thyroid levels. The other possible aetiologies of stroke in young were ruled out by a thorough

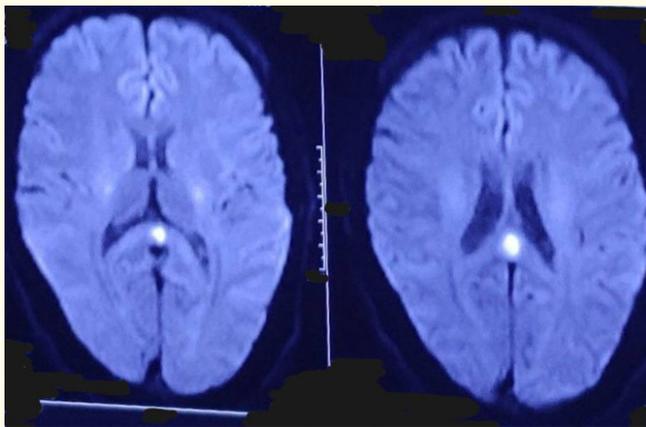


Figure 1: MRI brain DWI image showing small restriction at the splenium of corpus callosum suggesting acute infarct.

workup and relevant investigations. Her MR angiograms of the brain and neck vessels were normal. Her 2D echocardiography, 24-hour Holter monitoring, serum vasculitic panel including ANA, an extended ANA panel, and serum homocysteine levels were all reported to be normal. In view of the recent COVID-19 infection, her COVID-19 antibody panel was sent, which was remarkably high as well as having high D dimer levels. She had a monophasic disease course and showed significant clinical improvement on conservative treatment over a next couple of weeks.

Discussion

The corpus callosum is the largest subcortical commissural fibre and plays an important role in various cerebral functions. It has an abundant blood supply from bilateral cerebral circulation [1]. As it is highly vascularized, it is less likely to get infarcted. The posterior pericallosal (or splenial) artery, a branch of the ipsilateral posterior cerebral artery (P3), supplies the splenium [2]. Isolated corpus callosum infarction may have specific characteristics known as callosal disconnection syndrome (CDS) [1]. Callosal infarction is a white matter stroke that has a relatively low incidence. In elderly patients with multiple vascular risk factors and sudden mental status changes or cognitive impairments, the possibility of callosal infarction needs to be considered [3]. In our case, it has been observed that an acute ischaemic stroke strategically located to splenium of the corpus callosum can happen in a young female after recovery from a recent COVID-19 infection without any apparent vascular risk factors.

Acute cerebrovascular accidents are not rare in patients with COVID-19, especially in severely infected patients with pre-existing vascular risk factors.^[4] Patients with COVID-19 may develop or even present with acute cerebrovascular disease. Ischemic large vessel strokes, at times in multiple vascular territories, appear to be the most common manifestation, followed in order of decreasing frequency by intracerebral haemorrhage, venous infarctions, and, possibly, vasculitis. The frequency has been reported at between 1 and 6% in hospitalised patients. Strokes often occur 1-3 weeks following the onset of COVID-19 symptoms. The mechanism is likely due to thrombosis secondary to the associated hypercoagulable state.

Depending on the pattern of large vessel occlusion and multiple territory infarctions in COVID-19-associated strokes, it was proposed that cerebral thrombosis and/or thromboembolism could be possible causative pathways for the disease [4]. Not all patients with COVID-19-associated strokes are elderly with associated vascular risk factors. Stroke can also be the presenting manifestation of COVID-19 in younger adults [5]. These patients often do not have significant risk factors for stroke and may have only mild or even absent respiratory symptoms of COVID-19. Patients often have elevated inflammatory markers and evidence of a pro-thrombotic state. Endothelial injury may be another contributing factor to COVID-associated strokes, both in younger individuals and in the elderly. As per the meta-analysis of ischemic stroke associated with COVID-19, the pooled prevalence of ischemic stroke in COVID-19 was 2% (95% CI 1-2%; $p < 0.01$), and the pooled proportions of females were 36% (95% CI 21-50%; $p < 0.01$) [6].

As per the studies conducted earlier, the clinical manifestation of acute corpus callosum (CC) infarction is complex and lacks specificity. Until there is a high index of suspicion, it can be easily missed, specifically in the early stages. It often occurs with other cerebral ischemic lesions, unlike in our case, where it's only restricted to the splenial area. The typical symptoms of callosal infarction are consciousness or cognitive change and apraxia, such as alien hand syndrome with mild paralysis [7] although in our case it is just an isolated, abrupt-onset behavioural change. CC infarct is usually associated with traditional vascular risk factors, but it can be a rare presentation of post-COVID ischaemic stroke as a manifestation of a hyperinflammatory state.

Conclusion

Abrupt-onset behavioural abnormalities need to always be always taken seriously, as prompt identification of the cause can avoid some catastrophic consequences. Stroke following COVID-19 is not uncommon, but an abrupt behavioural abnormality following recovery from COVID-19 in a young lady without any apparent vascular risk factors showing MRI evidence of strategically located infarction in the splenium of the corpus callosum without any other typical signs of callosal infarction is probably the first reported case in the literature.

Bibliography

1. Zhang Z., *et al.* "Clinical Features, Etiology, and 6-Month Prognosis of Isolated Corpus Callosum Infarction". *BioMed Research International* (2019): 9458039.
2. Kasow DL., *et al.* "Corpus callosum infarcts with atypical clinical and radiologic presentations". *American Journal of Neuro-radiology* 21.10 (2000): 1876-1880.
3. Sun X., *et al.* "Clinical, neuroimaging and prognostic study of 127 cases with infarction of the corpus callosum". *European Journal of Neurology* 26.8 (2019): 1075-1081.
4. Nannoni S., *et al.* "Stroke in COVID-19: A systematic review and meta-analysis". *International Journal of Stroke* 16.2 (2021): 137-149.
5. Oxley TJ., *et al.* "Large-Vessel Stroke as a Presenting Feature of Covid-19 in the Young". *The New England Journal of Medicine* 382.20 (2020): e60.
6. Luo W., *et al.* "Ischemic stroke associated with COVID-19: a systematic review and meta-analysis". *Journal of Neurology* 269.4 (2022): 1731-1740.
7. Yang LL., *et al.* "Clinical features of acute corpus callosum infarction patients". *International Journal of Clinical and Experimental Pathology* 7.8 (2014): 5160-5164.